

6. Plant nutrition

6.1 Photosynthesis

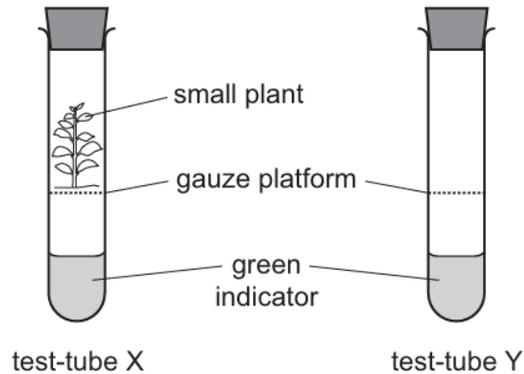
Paper 1 and 2

Question Paper

Paper 1

Questions are applicable for both core and extended candidates

1 An experiment is set up as shown.



The green indicator:

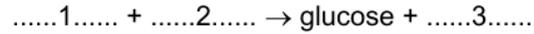
- turns yellow when the carbon dioxide concentration increases
- turns blue when the carbon dioxide concentration decreases.

After several hours, the indicator in test-tube X turned blue. The indicator in test-tube Y remained green.

Which process caused the colour change?

- A germination
- B photosynthesis
- C respiration
- D transpiration

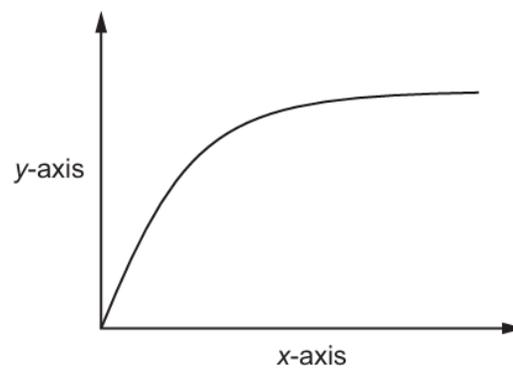
- 2 The equation for photosynthesis is shown.



Which words correctly complete gaps 1, 2 and 3?

	1	2	3
A	carbon dioxide	light	oxygen
B	carbon dioxide	water	oxygen
C	oxygen	light	carbon dioxide
D	oxygen	water	carbon dioxide

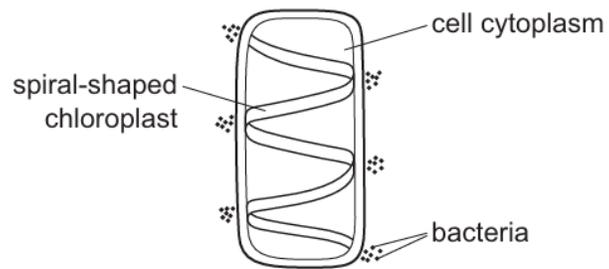
- 3 The graph shows the results of an experiment that investigated the effect of light intensity on the rate of photosynthesis.



What are the labels for the x-axis and the y-axis?

	x-axis	y-axis
A	light intensity	rate of oxygen production
B	light intensity	rate of carbon dioxide production
C	rate of carbon dioxide production	light intensity
D	rate of oxygen production	light intensity

- 4 Which substance is an ion that is used to make chlorophyll?
- A calcium
 - B iron
 - C magnesium
 - D starch
- 5 Which process decreases the amount of carbon dioxide in the atmosphere?
- A combustion
 - B decomposition
 - C photosynthesis
 - D respiration
- 6 The diagram shows a cell with groups of bacteria around its edge.



The bacteria have moved to areas of high oxygen concentration.

Which process in the cell causes the bacteria to form these groups?

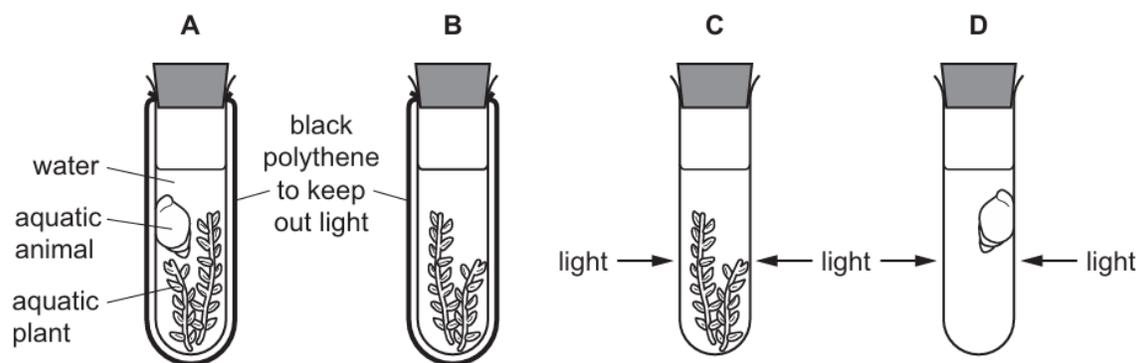
- A digestion
- B photosynthesis
- C reproduction
- D respiration

7 How are most leaves adapted for photosynthesis?

- A They have a large surface area and are thick.
- B They have a large surface area and are thin.
- C They have a small surface area and are thick.
- D They have a small surface area and are thin.

8 Four test-tubes are set up as shown.

Which test-tube contains the least carbon dioxide after one hour?



9 Which row shows the uses of some carbohydrates in plants?

	glucose	starch	sucrose
A	cell walls	transport	energy storage
B	energy storage	cell walls	respiration
C	respiration	energy storage	transport
D	transport	respiration	cell walls

10 Which row shows what is needed for photosynthesis?

	carbon dioxide	chlorophyll	light	oxygen
A	yes	yes	yes	no
B	yes	no	yes	yes
C	no	no	no	yes
D	no	yes	no	no

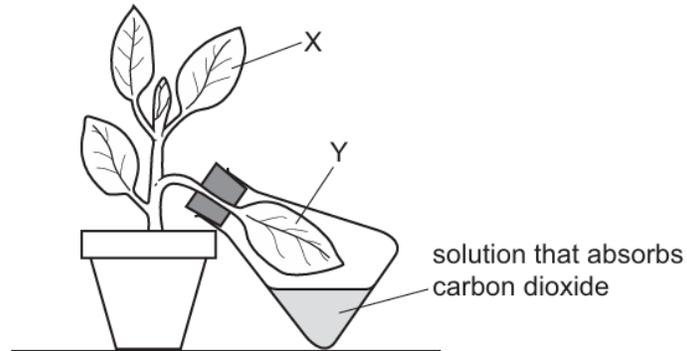
11 The substances listed are found in the leaf of a plant.

Which substance is obtained from the soil?

- A** carbon dioxide
- B** chlorophyll
- C** glucose
- D** mineral ions

- 12 The diagram shows an experiment to find out if carbon dioxide is necessary for photosynthesis.

The plant is kept in the dark for 48 hours to remove any starch. Then it is set up in the light, as shown.



After 10 hours, leaves X and Y were tested for starch.

What is the expected result?

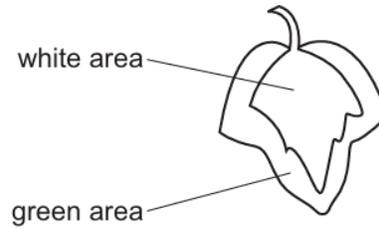
	presence of starch		
	in leaf X	in leaf Y	
A	✓	✓	key
B	x	x	✓ = present
C	✓	x	x = absent
D	x	✓	

- 13 Which chemical is a product of photosynthesis that moves out of a green leaf through its stomata?

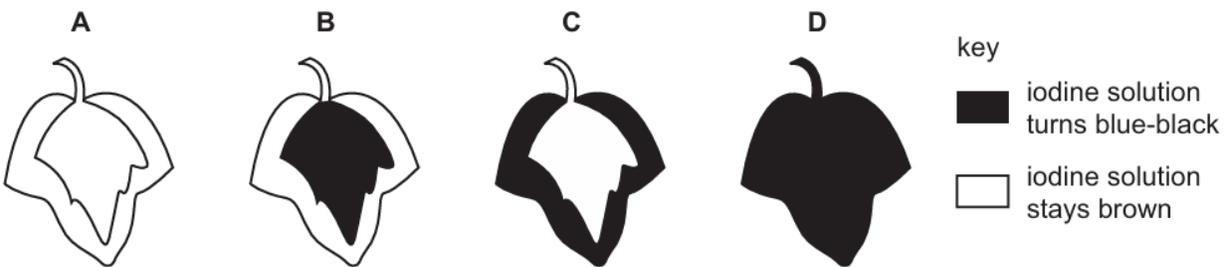
- A carbon dioxide
- B glucose
- C oxygen
- D water

- 14 In a photosynthesis experiment, a plant is left in bright sunlight for several hours. A leaf is then removed from the plant and tested for starch, using iodine solution.

The diagram shows the leaf from the plant that was used in the experiment.



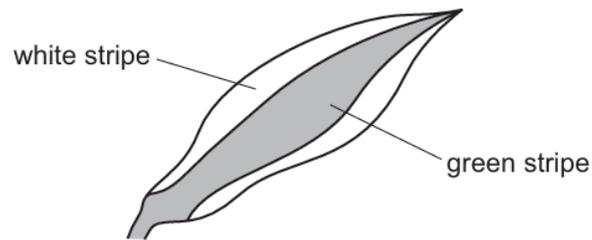
Which diagram shows the result of the experiment?



- 15 Which row shows the raw materials needed for photosynthesis and the products of photosynthesis?

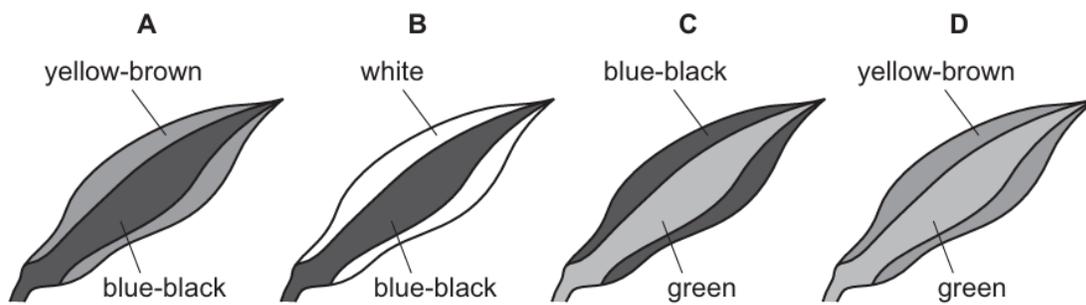
	raw materials	products
A	water + chlorophyll	carbon dioxide + glucose
B	carbon dioxide + water	chlorophyll + oxygen
C	oxygen + carbon dioxide	water + glucose
D	water + carbon dioxide	glucose + oxygen

- 16 A plant with striped leaves was kept in bright light for six hours.

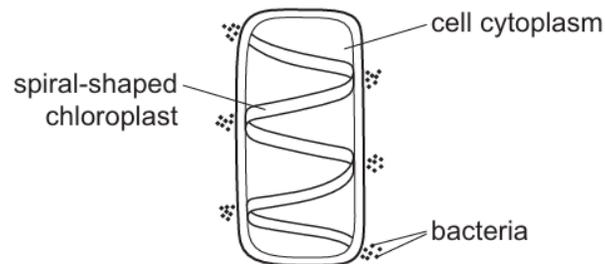


A leaf was taken from the plant and the chlorophyll was removed. The leaf was then tested for starch using iodine solution.

Which diagram shows the result of the test?



- 17 The diagram shows a cell with groups of bacteria around its edge.

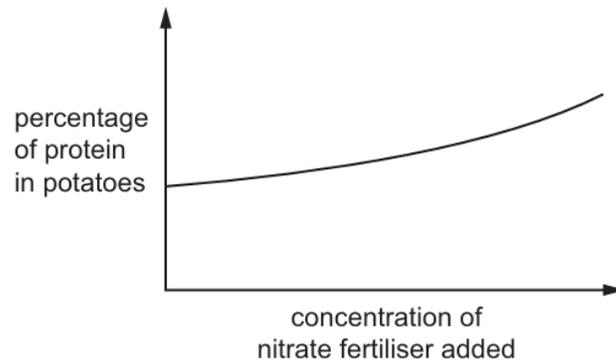


The bacteria move to areas of high oxygen concentration.

Which process in the cell causes the bacteria to form these groups?

- A digestion
- B photosynthesis
- C reproduction
- D respiration

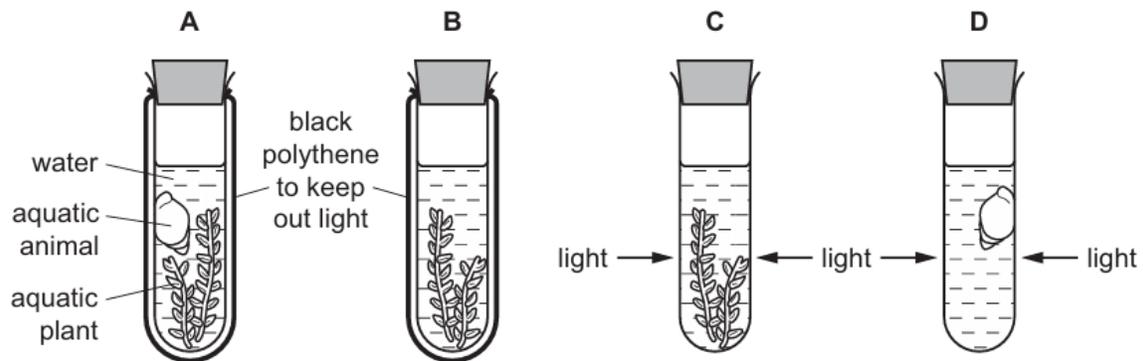
- 18 The graph shows how the percentage of protein found in potatoes was affected by the concentration of nitrate fertiliser added to the crop when it was growing.



These results suggest that greater concentrations of nitrate fertiliser allow the potatoes to make more

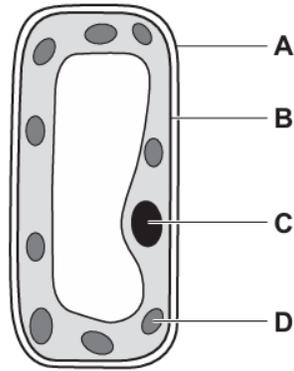
- A amino acids.
 - B cellulose.
 - C lipid.
 - D starch.
- 19 Four test-tubes are set up as shown.

Which test-tube contains the least carbon dioxide after one hour?

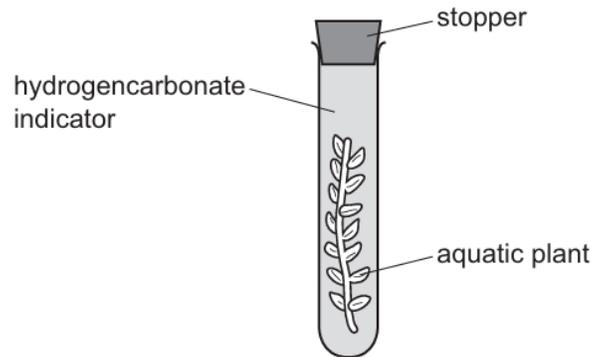


20 The diagram shows a plant cell.

In which part of the cell does photosynthesis occur?



21 Two sealed test-tubes containing aquatic plants and hydrogencarbonate indicator were set up.



The indicator in the sealed test-tubes shows the concentration of dissolved carbon dioxide present.

concentration of carbon dioxide	colour of indicator
low	red
medium	orange
high	yellow

One of the sealed test-tubes was kept in the light for 24 hours and one of the sealed test-tubes was kept in the dark for 24 hours.

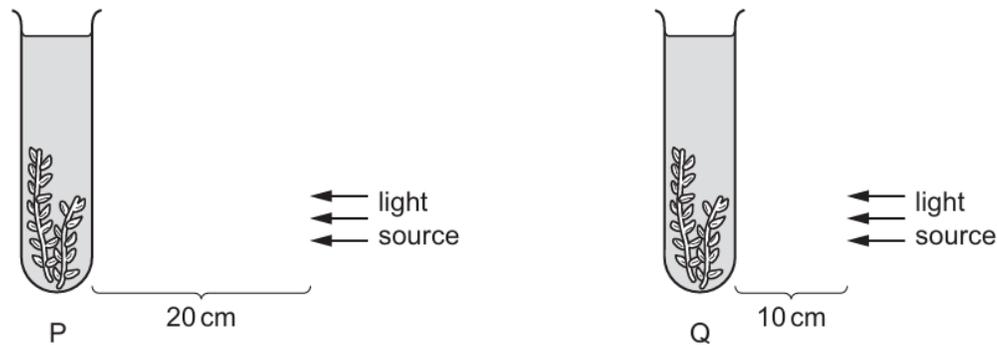
The results are shown in the table.

test-tube kept in	start colour	end colour
light	orange	red
dark	orange	yellow

What is the correct explanation of what has taken place?

- A** Photosynthesis and respiration both occur in the light, but the rate of photosynthesis is higher.
- B** Photosynthesis occurs in the light, but respiration does not.
- C** Respiration can only occur when photosynthesis is not taking place.
- D** The amount of carbon dioxide used and produced in the light is equal.

- 22 The diagram shows an experiment investigating the effect of light intensity on an aquatic plant.

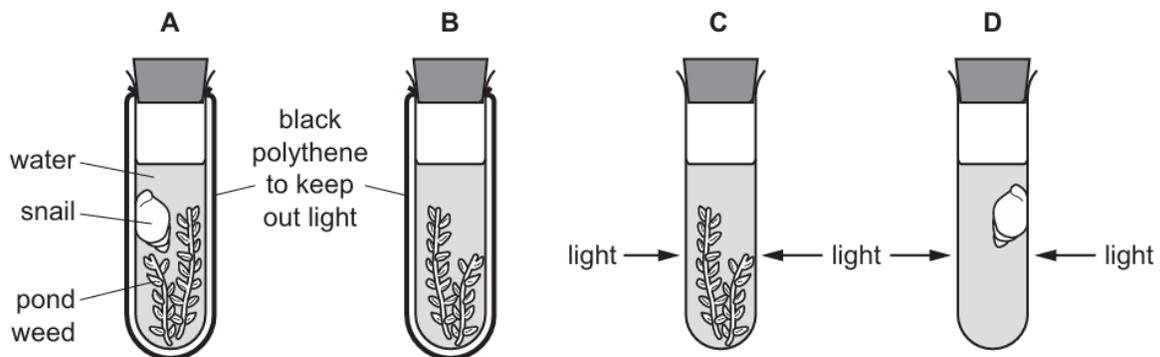


Photosynthesis occurred in both test-tube P and test-tube Q. Both test-tubes were kept at the same temperature. The number of bubbles produced in test-tube P was 12 bubbles per minute.

What is the most likely number of bubbles produced in one minute in test-tube Q?

- A** 0 **B** 3 **C** 12 **D** 48
- 23 The diagram shows an experiment to investigate the balance between respiration and photosynthesis.

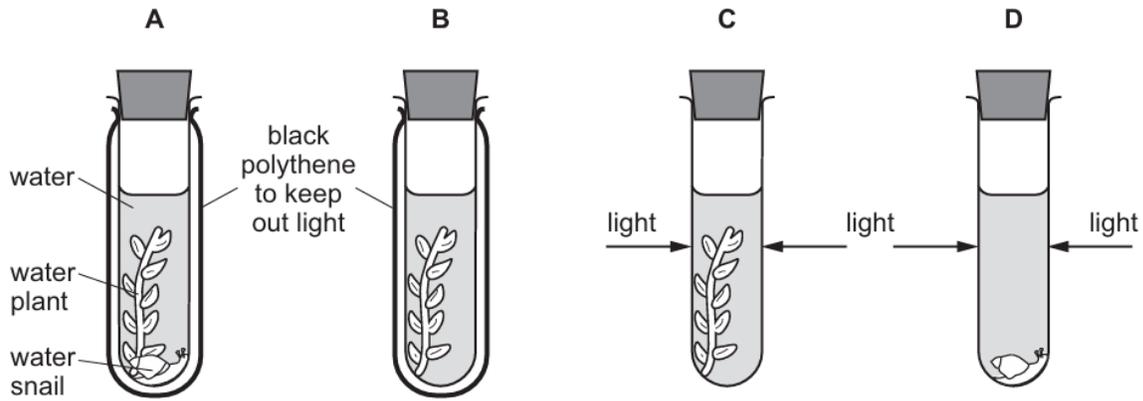
In which tube are photosynthesis and respiration taking place at the same time?



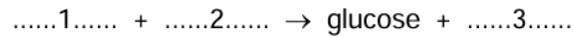
24 An experiment was carried out using the apparatus shown.

The carbon dioxide content of the water in each test-tube was measured at the start and again three hours later.

In which test-tube would there be a decrease in carbon dioxide content?



25 The equation for photosynthesis is shown.



Which words correctly complete gaps 1, 2 and 3?

	1	2	3
A	carbon dioxide	light	oxygen
B	carbon dioxide	water	oxygen
C	oxygen	light	carbon dioxide
D	oxygen	water	carbon dioxide

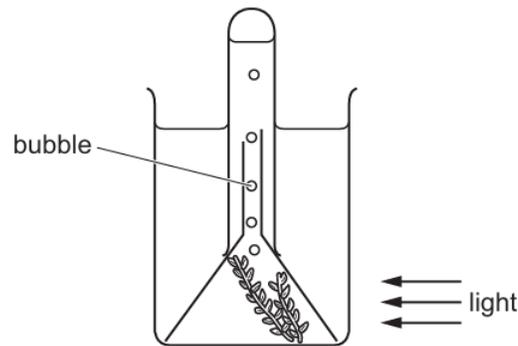
Paper 2

Questions are applicable for both core and extended candidates unless indicated in the question

- 26 The diagram shows an experiment to investigate the effect of increasing light intensity on the rate of photosynthesis in an aquatic plant.

The rate is found by measuring the rate of bubble release by the plant.

As the light intensity increases, the rate of bubble release increases and then becomes constant.



Which statement describes why the rate of bubble release becomes constant at high light intensities? **(extended only)**

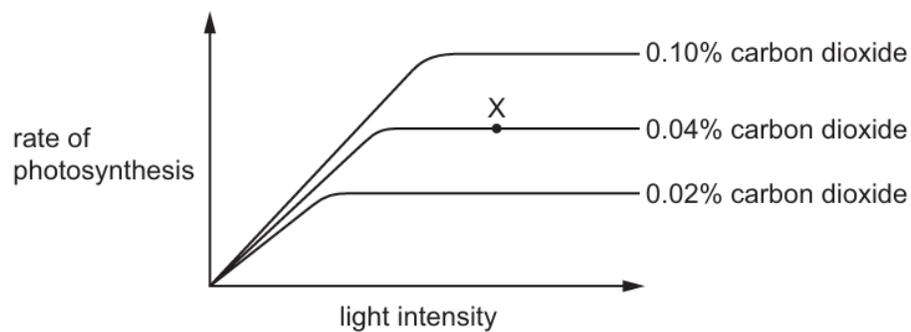
- A Carbon dioxide concentration becomes a limiting factor.
 - B Light intensity becomes a limiting factor.
 - C Oxygen availability becomes a limiting factor.
 - D Water availability becomes a limiting factor.
- 27 Which substance is needed to make chlorophyll and which part of the plant absorbs the substance?

	substance	part of the plant where the substance is absorbed
A	calcium	root hairs
B	calcium	stomata
C	magnesium	root hairs
D	magnesium	stomata

28 Which substance is an energy store that is made in plant cells from the products of photosynthesis?

- A cellulose
- B glycogen
- C nectar
- D starch

29 The graph shows how the rate of photosynthesis of a plant changes with light intensity, at three different carbon dioxide concentrations. In each case the temperature is 15 °C.

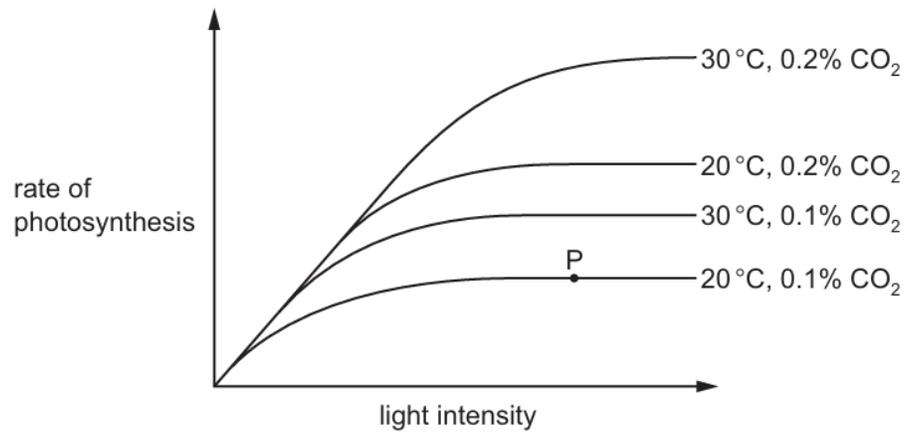


What is the limiting factor for the rate of photosynthesis at point X on the graph? **(extended only)**

- A carbon dioxide concentration
- B light intensity
- C surface area of the plant
- D temperature

30 The diagram shows how the rate of photosynthesis varies with light intensity.

The four curves show different conditions of temperature and carbon dioxide concentration.



What limits the rate of photosynthesis at point P? (**extended only**)

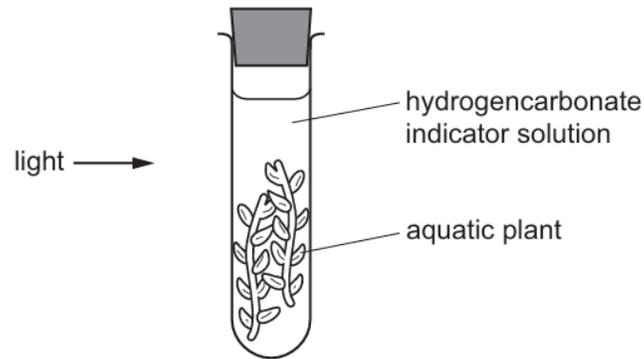
	light intensity	carbon dioxide concentration	temperature
A	✓	✓	x
B	✓	x	x
C	x	✓	✓
D	x	x	✓

key

✓ = yes

x = no

- 31 An experiment is set up to investigate gas exchange in aquatic plants.



The hydrogencarbonate indicator solution is orange at the start.

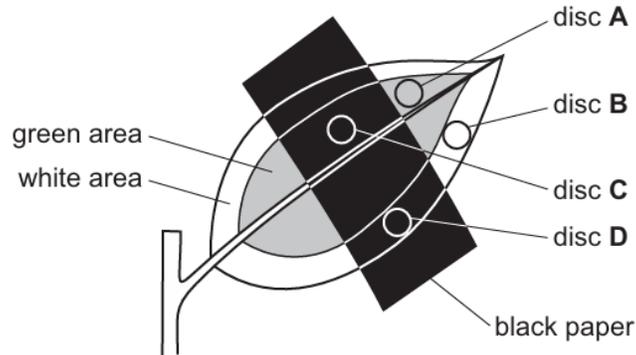
Which colour is it after three hours?

- A** blue-black
B orange
C purple
D yellow
- 32 Certain factors are needed for photosynthesis.
If a factor is in short supply, it limits the rate of photosynthesis.
Which of these could be limiting factors? **(extended only)**
- 1 carbon dioxide
2 oxygen
3 light intensity
- A** 1 and 2 **B** 1 and 3 **C** 2 and 3 **D** 3 only

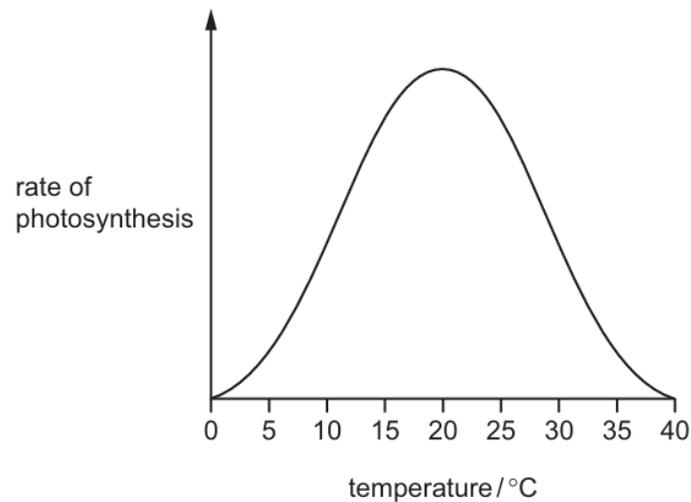
- 33 The diagram shows a leaf on a plant used in a photosynthesis experiment. At the start of the experiment, there is no starch in the leaf.

A piece of black paper is attached to the upper surface of the leaf. The plant is placed in bright light for 12 hours. Four discs are then cut from the leaf in the positions shown on the diagram. The discs are tested for starch.

Which disc contains starch?



- 34 The graph shows the effect of temperature on the rate of photosynthesis.

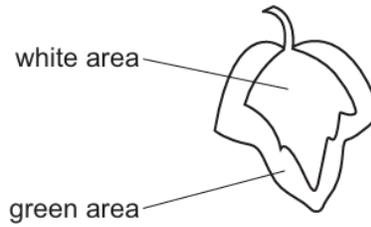


Which statement explains the change in rate of photosynthesis between 15°C and 20°C? **(extended only)**

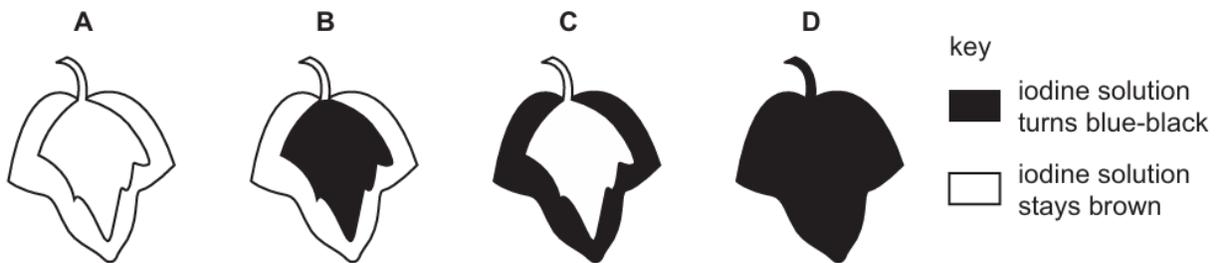
- A Chlorophyll is able to transfer more energy in chemicals to energy in light.
- B Enzymes involved in photosynthesis have denatured.
- C Kinetic energy of molecules is increasing, resulting in more effective collisions.
- D Light intensity and **not** temperature is limiting the rate of photosynthesis.

- 35 In a photosynthesis experiment, a plant is left in bright sunlight for several hours. A leaf is then removed from the plant and tested for starch, using iodine solution.

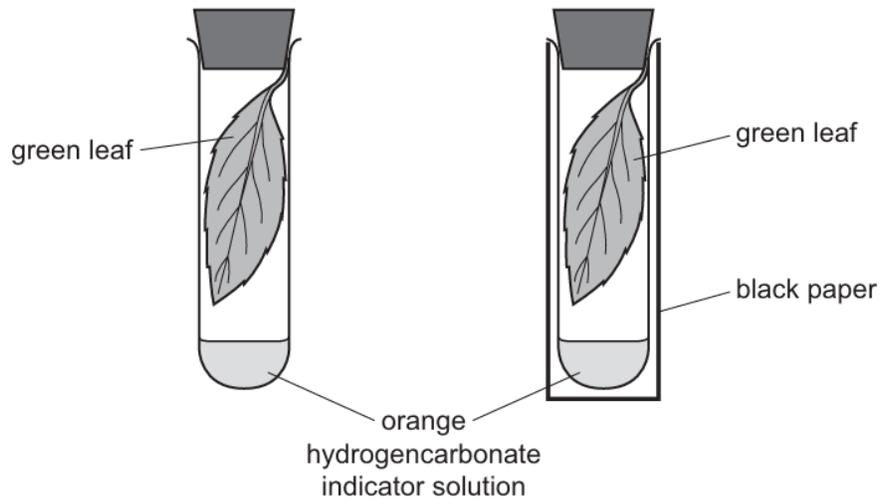
The diagram shows the leaf from the plant that was used in the experiment.



Which diagram shows the result of the experiment?



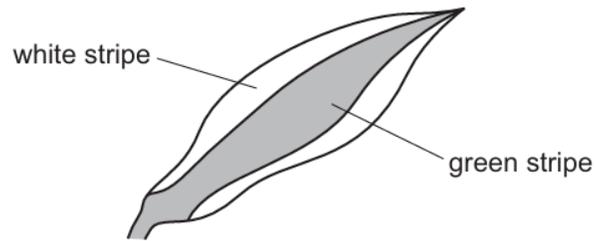
- 36 Two similar leaves are set up in test-tubes as shown. One is exposed to light, while the other is kept in the dark.



After a few hours, which colour would the hydrogencarbonate indicator solution be in each test-tube?

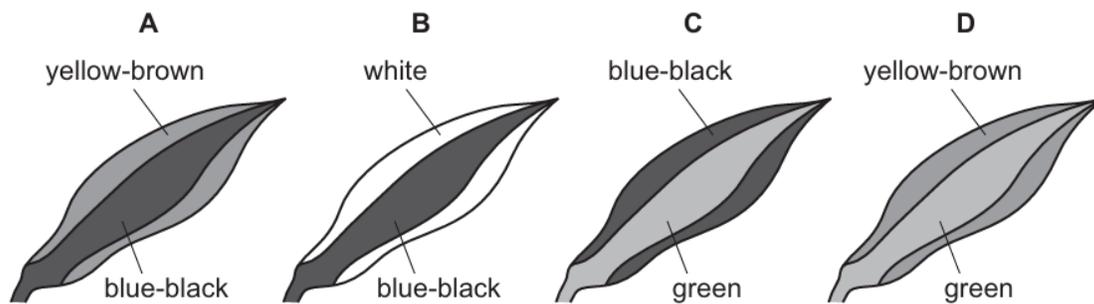
	light	dark
A	colourless	blue-black
B	purple	yellow
C	red	blue
D	yellow	purple

- 37 A plant with striped leaves was kept in bright light for six hours.

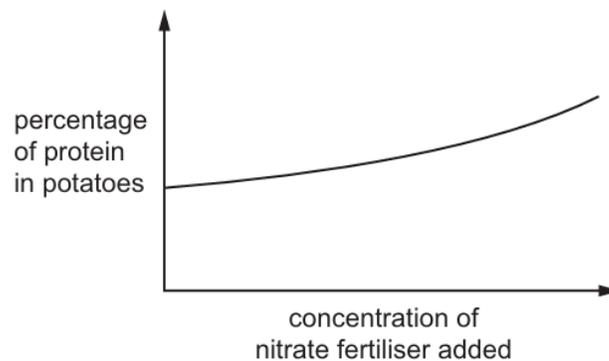


A leaf was taken from the plant and the chlorophyll was removed. The leaf was then tested for starch using iodine solution.

Which diagram shows the result of the test?



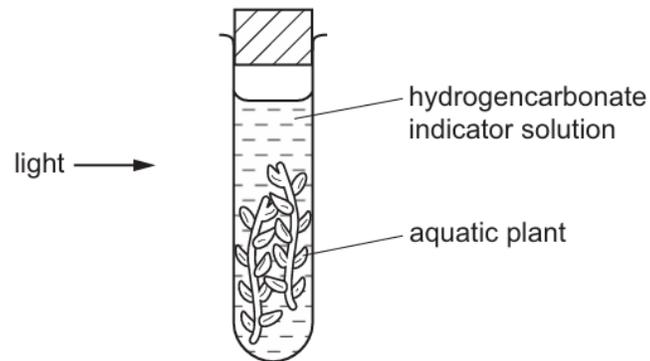
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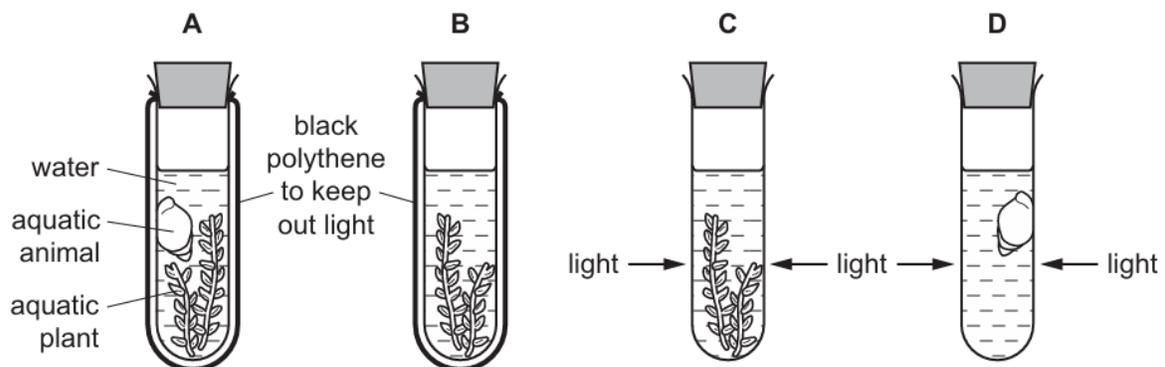
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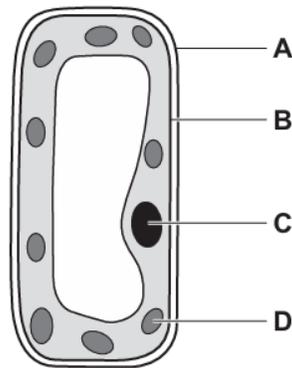
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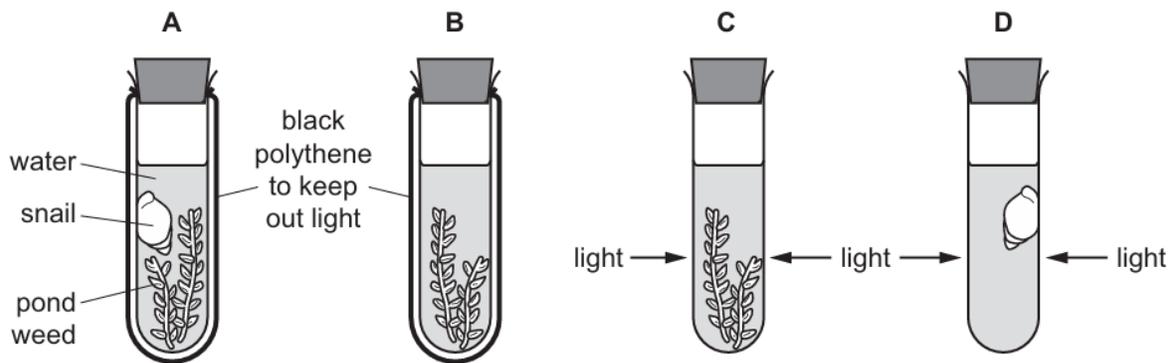
41 The diagram shows a plant cell.

In which part of the cell does photosynthesis occur?

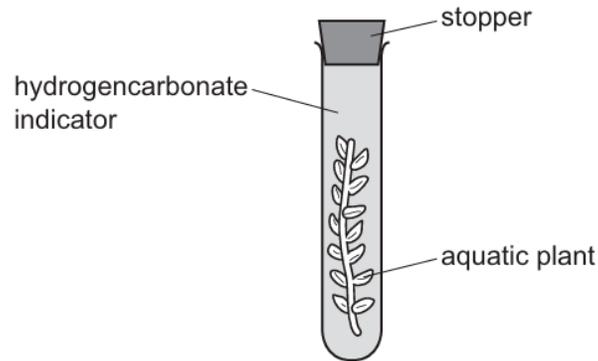


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